ITAPS Relations Interface: iRel

Timothy J. Tautges
Mathematics & Computer Science Division
Argonne National Laboratory

IRel: Relations Interface

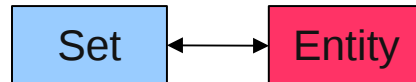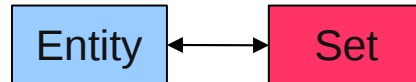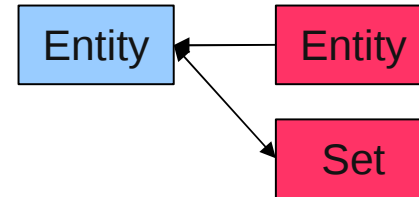- Purpose: relate entities between iface1 and iface2, without making those interfaces depend on each other; relates:

  Entity-Entity: Entity-Set: Entity-Both:

  | Entity | ←→ | Entity | | Entity | ←→ | Set | | Entity | ← | Entity |

  | Set | ←→ | Entity | | | → | Set |
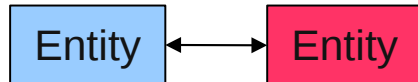
- "both"-type relations are for when
  - Entity1 is related to multiple Entity2's, and
  - Set2 exists for each group of Entity2's related to Entity1, and
  - You need fast retrieval of Entity1 from Entity2
- Both-both relations *not* supported
- Examples:
  - iGeom Entity (vertex/curve/surface/volume) related to iMesh EntitySet containing mesh resolving the entity
  - Others? (fields-tags, ???)
- Lasso: infers relations based on matching iGeom (Entity/type/GLOBAL_ID) to iMesh (Entity set/GEOM_DIMENSION/GLOBAL_ID)

iRel Data Model

- enum Iface_Type: necessary because ITAPS C-based interfaces prepend interface name on function name
  - iRel_IBASE_IFACE, iRel_IGEOM_IFACE, iRel_IMESH_IFACE, iRel_IFIELD_IFACE, iRel_IREL_IFACE
- ent_or_set designation: 0=entity, 1=set, 2=both
- iRel_RelationHandle: object which stores instance handles being related, ent_or_set designations
- iBase_Instance, iBase_EntityHandle, iBase_EntitySetHandle: used to refer to instance/entity/set handles from arbitrary interfaces

iRel API

- `_newRel, _dtor`: create/destroy iRel instance
- `_createRelation, destroyRelation`: create/destroy new relation
- `_getRelatedInterfaces`: get interfaces related by a given relation handle
- `_get/_set EntEnt/EntSet/SetEnt/SetSet Relation`: get/set relations between individual entities/sets
- `_set EntEnt/SetEnt/EntSet/SetSet ArrRelation`: set relations between one and several entities/sets
  - switch_order parameter for designating iface single entity belongs to
- `_get/_set EntArrEntArr/EntArrSetArr/SetArrEntArr/SetArrSetArr Relation`: get/set relations between pairs of entities/sets
- `_create Vtx/Ent/VtxArr/EntArr AndRelate`: mesh creation functions which take related geometry entity
- `_infer All/Ent/Set/EntArr/SetArr Relations`: infer relations (using criteria described earlier)
- `_moveTo`: move entities related to specified geometry entity to that geometry entity

- All functions have "iRel" prepended to name, e.g. iRel_newRel
- Include proposed API change from Associat(e/ion) to Relat(e/ion)

iRel Implementation

- Lasso (ANL) currently the only implementation
- iRel does *not* guarantee relations are persistent; that is, infer functions must be called every time

- This API and data model will probably change after iField is implemented, to handle relating fields (as entities, or other objects?) to tags